Table 82: Exponential Power of 2 + Butterfly Fractal1 + Mersenne Prime Squares

Exponential Power of 2 + Butterfly Fractal$_1$ + Mersenne Prime Squares

line #	*n = EVEN, except 1 & 3	$2^n = x$	$2^n - 1 = y$	2^{n-1}	$(2^{n-1}) - 1 = z$	xz = n∑n			
	n	x	y = x - 1		z = x + y	xz	yz	xy	
	n	$x = 2^{p-1} = 2^p/2$	y		$z = Mp = 2^p - 1$	PN	OC	CR	p
*1	1	2	1	1	0				
2	2	4	3	2	1				
*3	3	8	7	4	3	6	3	2	2
4	4	16	15	8	7	28	21	12	3
5	6	64	63	32	31	496	465	240	5
6	8	256	255	128	127	8128	8001	4032	7
7	10	1024	1023	512	511				
8	12	4096	4095	2048	2047				
9	14	16384	16383	8192	8191	33550336	33542145	16773120	13
10	16	65536	65535	32768	32767				
11	18	262144	262143	131072	131071	8589869056	8589737985	4294901760	17
12	20	1048576	1048575	524288	524287	137438691328	137438167041	68719214592	19
13	22	4194304	4194303	2097152	2097151				
14	24	16777216	16777215	8388608	8388607				
15	26	67108864	67108863	33554432	33554431				
16	28	268435456	268435455	134217728	134217727				
17	30	1073741824	1073741823	536870912	536870911				
18	32	4294967296	4294967295	2147483648	2147483647	2305843008139952128	2305843005992468481	1152921503533105152	31
19	34	17179869184	17179869183	8589934592	8589934591				
20	36	68719476736	68719476735	34359738368	34359738367				
21	38	274877906944	274877906943	137438953472	137438953471				
22	40	1099511627776	1099511627775	549755813888	549755813887				
23	42	4398046511104	4398046511103	2199023255552	2199023255551				
24	44	17592186044416	17592186044415	8796093022208	8796093022207				
25	46	70368744177664	70368744177663	35184372088832	35184372088831				
26	48	281474976710656	281474976710655	140737488355328	140737488355327				
27	50	1125899906842624	1125899906842623	562949953421312	562949953421311				
28	52	4503599627370496	4503599627370495	2251799813685248	2251799813685247				
29	54	18014398509481984	18014398509481983	9007199254740992	9007199254740991				
30	56	72057594037927936	72057594037927935	36028797018963968	36028797018963967				
31	58	288230376151711744	288230376151711743	144115188075855872	144115188075855871				
32	60	1152921504606846976	1152921504606846975	576460752303423488	576460752303423487				
33	62	4611686018427387904	4611686018427387903	2305843009213693952	2305843009213693951	26584559915698317446546926159538421 76	26584559915698317423488496067401482 25	13292279957849158717508855556734976 00	61
34	64	18446744073709551616	18446744073709551615	9223372036854775808	9223372036854775807				

- **n** and 2^n play a fundamental role in defining the **Mp** and its square, the **MPS**. Lines 1-3 are there for completeness. Easier to start with Line 4.
- All parameters of the **MPS** defined. All **n** = EVEN numbers (except Lines 1 & 3).
- The exponential power of 2 itself generates a bilateral, mirror-symmetric fractal of itself (Butterfly Fractal$_1$), directly informing **x** — and $\mathbf{x^2}$, following with **y** = **x** - 1 = $\mathbf{2^n}$ - 1.
- Added together, **x** + **y** = **z** = **Mp**, and of course, $\mathbf{z^2}$ = $\mathbf{Mp^2}$ = **MPS**.
- Here, we show that **z** = ($\mathbf{2^{n-1}}$) - 1 which is the same as $\mathbf{2^p}$ - 1, reveals how, without knowing any of the PRIMES (**p**)— especially the Mersenne Primes (**Mp**) — one can fully define the entire **MPS** and all of its generations including the **PN** = **xz**, the **OC** = **yz**, and the **CR** = **xy**.
- The remaining **PNS** = $\mathbf{x^2}$, **OCS** = $\mathbf{y^2}$ and the **MPS** = $\mathbf{z^2}$.
- Notice that **p** falls half way between the **n** values, naturally as one would expect, being that it represents the special case where $\mathbf{2^p}$ - 1 (as shown in Dark BLUE) = **Mp** = **z,** and, $\mathbf{2^{p-1}}$ (as shown in Dark BLUE) = $\mathbf{2^n}$ = **x**.
- Together, **xz** = $\mathbf{2^{p-1}}$ ($\mathbf{2^p}$ -1) = **PN** is the *Euclid-Euler Theorem*.
- Below the *Euclid-Euler Theorem* lies the more fundamental exponential power of 2 as the Butterfly Fractal1 primary wave, that, when interfering with the larger PRIMES wave, reveals the very special — and quite specific — relationship between the Mersenne Primes and Perfect Numbers.